

# Semantic OLAP: Using OLAP Functionality to Analyse Semantic MediaWiki Data

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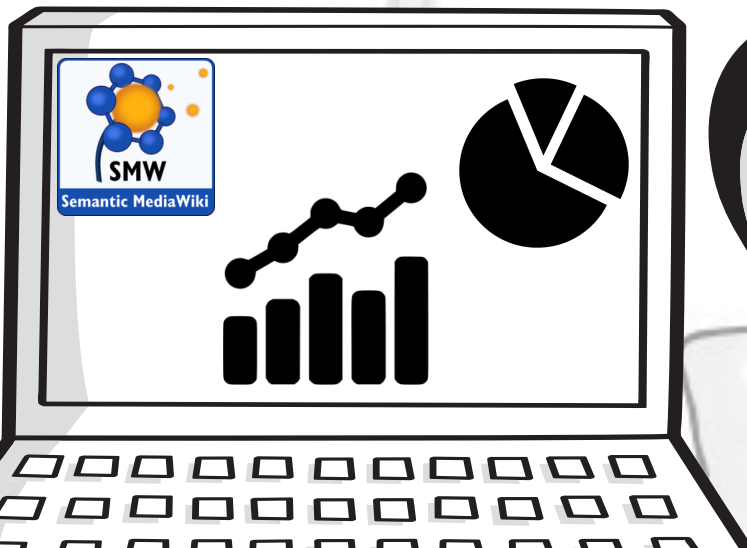


# Motivation

Martin often calls me to get Information from our wiki about the patients

Don't worry Martin! I'll have a look!

Hi Tob! Can you please look up how many patients in our system has asthma and what their age is?

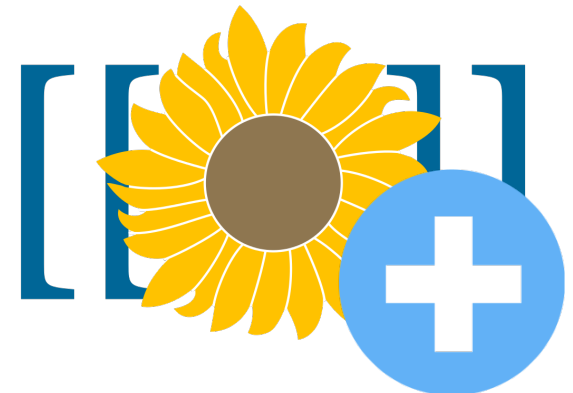


# Motivation

- Users want to analyse data
  - Have ad-hoc requests
  - Are not always familiar with wiki language
- Analyse data in Semantic MediaWiki
  - Integrated System
- Search functionality does not always answer questions
  - Overview about data is preferable
  - Aggregation functionality is preferable
- Export functionality to reuse data in other tools

# Related Extensions

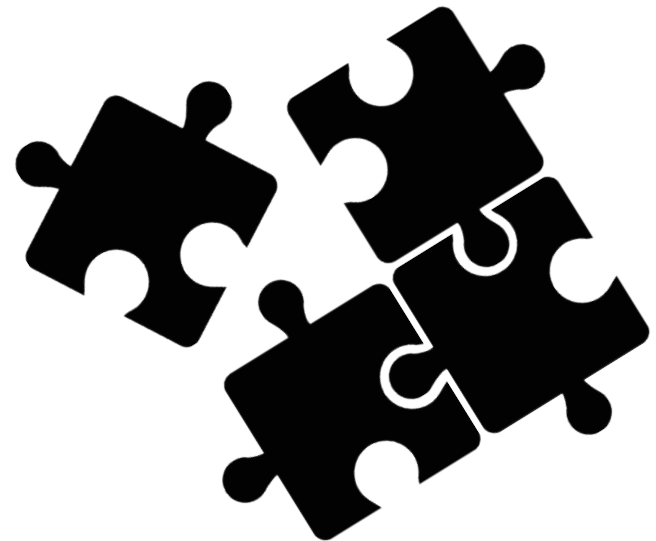
- Google Analytics Integration, Open Web Analytics, Piwik Integration
  - Statistics about wiki pages (e.g. Access)
- EventLogging
  - Captures and analysis reads and edits of wiki pages
- SemanticWebBrowser
  - Faceted Browsing
  - Does only allow to browse the data and not really analyse





# Contribution

- Extension for SMW to analyse the data in Semantic MediaWiki by using OLAP functionality
- OLAP functionality
  - Pivoting
  - Roll Up
  - Drilldown
  - Slice
- Export data in Excel



# Sneak Preview



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Special page

## SemanticOLAP

Select Data

Rows:     Columns:     Export: 

Fields

Has Asthma

# Has Asthma

Has BMI

# WikiPage

Data


Has Alter (sum)

Wiki Page

RektumPatient 1	66
RektumPatient 10	62
RektumPatient 100	15
RektumPatient 1000	63
RektumPatient 1001	70
RektumPatient 1002	40
RektumPatient 1003	41

# Implementation

- First Step is to Query the Data
- Users may be not familiar with ASK Queries
  - Help with a form



Special page

## SemanticOLAP

**Select at least one Category**

**Select at least one Property**

**Submit**

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**Semantic**


[Create Category](#)

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# Implementation

- Form provides Autocomplete
- At least one category and property must be selected
  - Otherwise ASK Query does not work
  - Multiple Categories and Properties can be selected



Special page

## SemanticOLAP

Select at least one Category

× Patient

Select at least one Property

× Has BMI as

Has Asthma

Has Ausschleusen

Has BLE

Has BMI

Has Beginn Einleitung

Has Beginn Schnitt

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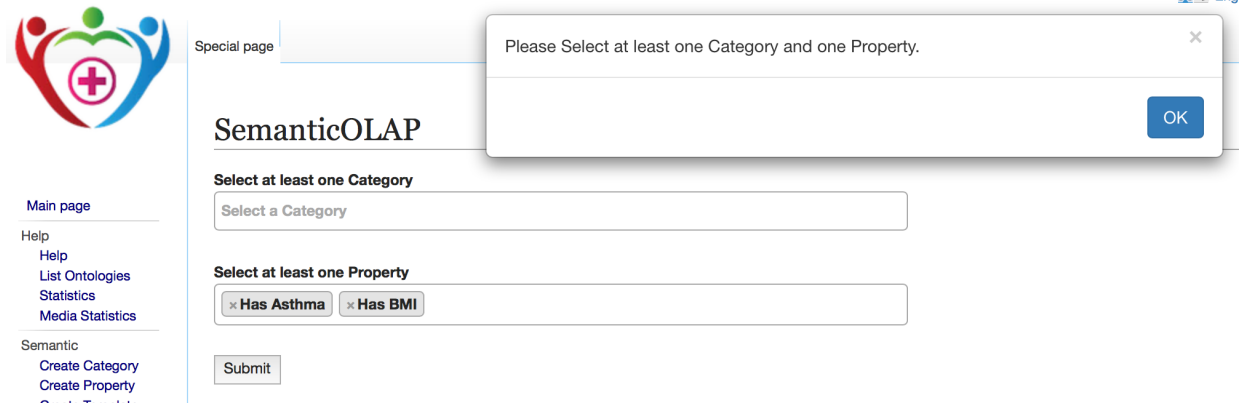
Maintenance Report

Forms

Wanted Pages

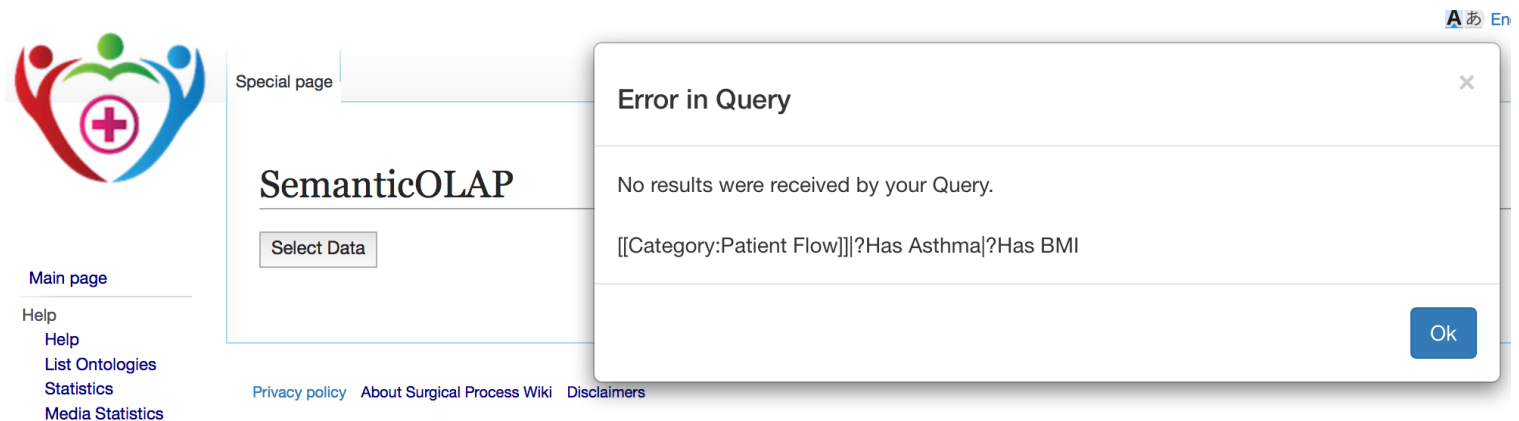
# Implementation

- Errors help users to comprehend false input
  - Missing input



The screenshot shows the SemanticOLAP web application. On the left is a navigation menu with links: Main page, Help, List Ontologies, Statistics, Media Statistics, Semantic, Create Category, Create Property, and a partially visible link. The main content area has a 'Special page' tab selected. Below it, the title 'SemanticOLAP' is followed by two sections: 'Select at least one Category' with a text input field containing 'Select a Category', and 'Select at least one Property' with two buttons labeled 'Has Asthma' and 'Has BMI'. A 'Submit' button is at the bottom. A modal dialog box is open, displaying the message 'Please Select at least one Category and one Property.' with an 'OK' button.


- No results gained



The screenshot shows the SemanticOLAP web application. The navigation menu is visible on the left. The main content area has the 'Special page' tab selected. Below the title 'SemanticOLAP', there is a 'Select Data' button. A modal dialog box titled 'Error in Query' is open, displaying the message 'No results were received by your Query.' followed by the query string '[[Category:Patient Flow]]?Has Asthma?Has BMI'. An 'Ok' button is at the bottom right of the dialog.

# Implementation










- Results from ask Queries are processed and presented



Special page

## SemanticOLAP

Select Data

Rows:     Columns:     Export: XLS 

Fields **Has Asthma** **# Has Asthma** **Has BMI** **# WikiPage**

Data **Has Alter (sum)**

**Wiki Page**

RektumPatient 1	66
RektumPatient 10	62
RektumPatient 100	15
RektumPatient 1000	63
RektumPatient 1001	70
RektumPatient 1002	40
RektumPatient 1003	41

# Implementation

- For properties that are used multiple times on wiki pages, the amount of usage is given additionally
  - Marked with Hashtag (#)

Has Anforderungszeit 1 January 2015 10:18:25 + 🔍  
Has Asthma false + 🔍 and true + 🔍  
Has Ausschleusen 1 January 2015 19:55:00 + 🔍



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Create Page with Form

Cognitive Process

## SemanticOLAP

Select Data

Rows:     Columns:     Export: XLS 

Fields

Has Asthma

# Has Asthma

Has BMI

# WikiPage

Data

Has Alter (sum)

Wiki Page



# Implementation



University Hospital Heidelberg



Karlsruhe Institute of Technology

## ■ Units of Properties of type **Quantity** are considered

- List of units are not yet completed
- Unknown units are not displayed



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Special page

## SemanticOLAP

Select Data

Rows:



Columns:



Fields

Has Alter

Has Asthma

# Ha

Data

Has Blutverlust (sum in ml)

Wiki Page	
RektumPatient 1	1866 ml
RektumPatient 10	
RektumPatient 100	800 ml
RektumPatient 1000	500 ml
RektumPatient 1001	50 ml
RektumPatient 1002	500 ml

# Implementation

- Drag&Drop fields to columns or rows
  - OLAP functionality: Pivoting / Split

Special page

## SemanticOLAP

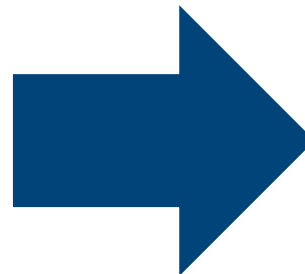
Select Data

Rows: Columns: Export: XLS

Fields # Has Asthma Has BMI # WikiPage

Data Has Alter (sum)

	Has Asthma
Wiki Page	
RektumPatient 1	66
RektumPatient 10	62
RektumPatient 100	15



Special page

## SemanticOLAP

Select Data

Rows: Columns: Export: XLS

Fields # Has Asthma Has BMI # WikiPage

Data Has Alter (sum)

	Has			
Wiki Page	f & t		f	t
RektumPatient 1	66			
RektumPatient 10	62			
RektumPatient 100			15	
RektumPatient 1000			63	
RektumPatient 1001			70	

# Implementation

- Drag&Drop fields to columns or rows
  - OLAP functionality: Pivoting / Split
  - Row/Columns Sum can be toggled






















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Special page

## SemanticOLAP

Select Data

Rows:                        

# Implementation

- Filter for specific values
  - OLAP functionality: Slice/Dice
  - Filter with matches

- Sort values



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




Admin

Special Pages

Special page

## SemanticOLAP

Select Data

Rows:     Columns:     Export: XLS 

Fields

Has Asthma



# Has Asthma

Has BMI

# WikiPage

Data

Has Alter (sum)

Matches  search 

☒ (Show All)

☒ 15

☒ 28

☒ 40

☒ 41

☒ 46

☒ 49

☒ 51

Ok Cancel

Wiki Page

RektumPatient 1

66

RektumPatient 10

62

RektumPatient 100

15

# Implementation

## ■ Export Pivot table into xls



Special page

### SemanticOLAP

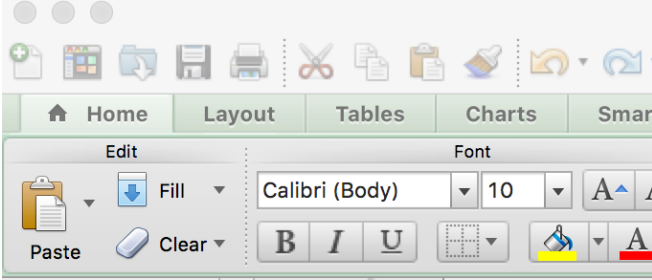
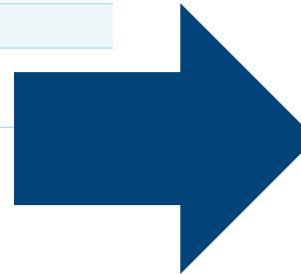
Select Data

Rows: Columns: **Export: XLS**

Fields: Has Asthma # Has Asthma Has BMI # WikiPage

Data: Has Alter (sum)

Wiki Page



	A	B	C	D	E
1	Data	Has Alter			
2					
3					
4	Wiki Page	Grand Total			
5	RektumPatient 1	66			
6	RektumPatient 10	62			
7	RektumPatient 100	15			
8	RektumPatient 1000	63			
9	RektumPatient 1001	70			
10	RektumPatient 1002	40			
11	RektumPatient 1003	41			
12	RektumPatient 1004	63			
13	RektumPatient 1005	60			
14	RektumPatient 1006	56			
15	RektumPatient 1007	46			
16	RektumPatient 1008	59			
17	RektumPatient 1009	71			

# Conclusion

- SemanticOLAP allows to analyse Semantic MediaWiki Data
  - Providing OLAP functionality
  - Not restricted to specific use-case
  
- Usable by non wiki-experts
  - More trust in the analysis and system
  - Users are not dependent of wiki experts
  
- We use SemanticOLAP to
  - Allow Physicians to query data
  - Analyse data
    - Select patients for studies